

# Performance-Based Navigation (PBN)

## PBN Implementation Process Order 7100.41

**Date: April 2014**



**Federal Aviation  
Administration**



# Overview

- **Purpose of FAA Order 7100.41, PBN Implementation Process**
- **Audience**
- **Benefits of the 7100.41**
- **Requirements of the 7100.41**
- **Baseline Analysis Review (BAR) Elements**
- **Five Phases Process**
- **NAC Recommendations vs. 7100.41**



# Purpose

- Provides a standardized development and implementation process for PBN procedures and routes
  - RNAV/RNP SID
  - RNAV/RNP STAR
  - RNAV AR SIAP
  - Q, T and TK Routes
  - RNAV/RNP transitions to SIAPS
- Does not cover development and implementation of
  - RNAV (GPS, GLS, LPV)
  - Conventional (ILS, VOR, NDB)
- Does not eliminate the SMS process required in the decommissioning process of existing NAVAIDs
- Designed to be used by a Workgroup to meet agreed-upon project goals



# Audience

- All ATO Service Units
  - En Route and Oceanic
  - Terminal
  - Technical Operations
  - Mission Support
  - System Operations
  - Safety and Technical Training



# PBN Implementation Order Benefits

- Meets the requirements of the Safety Management System (SMS) and deemed compliant by the Office of Safety
- Supersedes the interim safety guidance implemented in 11/1/12
- Implements a business case analysis process for proposed procedures, Baseline Analysis Report (BAR)
- Uses a tracking tool, Procedure Tracking Tool (PTT)
- Addresses NextGen Advisory Committee (NAC) recommendations
- Continues collaboration with key stakeholders



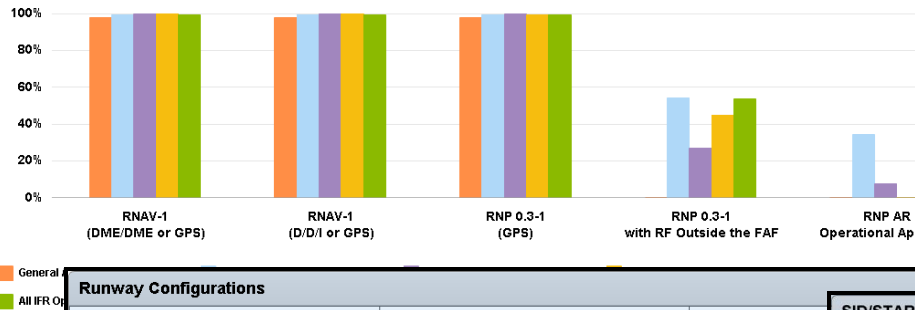
# PBN Implementation Order Requirements

- Requires a pre-RAPT evaluation
  - Proponent required to submit rationale
  - Core Working Group completes Baseline Analysis Report
    - Procedure Conceptualization
    - Estimated Benefits
    - Potential Issues
  - AJV-14 reviews and approves for RAPT submission
- Requires a Post Implementation Analysis Report
  - Benefits validation
  - Project lessons learned

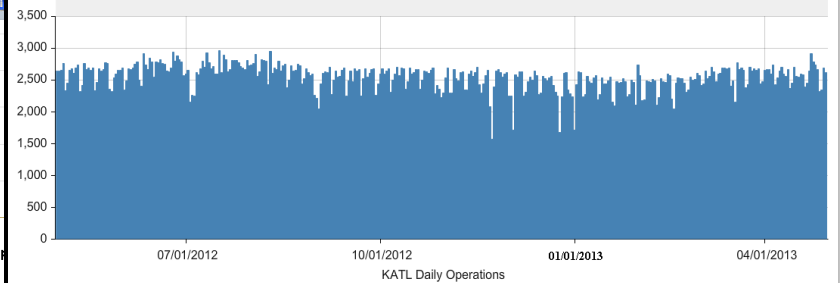


# Baseline Analysis Review (BAR) Elements

PBN Equipped Capability by Operator Type



Daily Operations



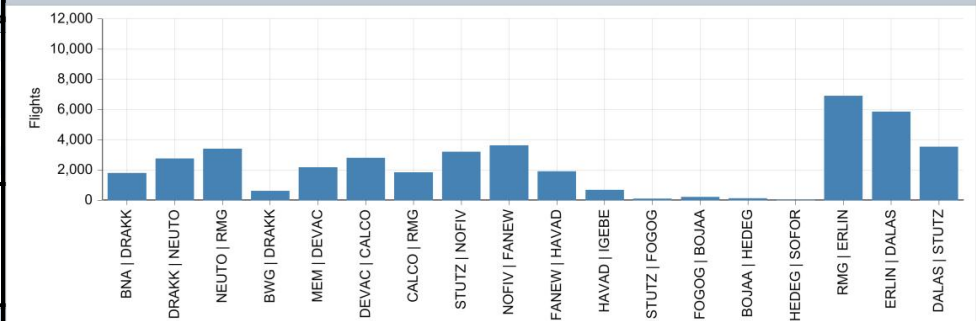
Runway Configurations

Arrival Runway Configurations	Departure Runway Configurations	% of Flights Configuration
26R, 27L, 28	26L, 27R	54
8L, 9R, 10	8R, 9L	37
26R, 27L, 28	26L, 27R, 28	3
8L, 9R, 10	8R, 9L, 10	1
		1

Operation Summary

Average Daily Operations	2,547
Total Operations	929,781

SID/STAR Segment Usage



Airport ID : KATL | Procedure Name : ERLIN1 | Type : RNAV STAR | 04/01/2013 - 04/30/2013

90% Conformance 10% 90%



Operators

Carrier	Full Name	Operation Count
DAL	DELTA AIR LINES	463,027
ASQ	EXPRESSJET	200,462
TRS	TRS	122,176
FLG	PINNACLE AIRLINES	32,942
SWA	SOUTHWEST AIRLINES	19,759
EGF	AMERICAN EAGLE AIRLINES	11,932
AWE	US AIRWAYS	10,722
AAL	AMERICAN AIRLINES	9,481
GA	GENERAL AVIATION	5,029
TCF	SHUTTLE AMERICA	4,293



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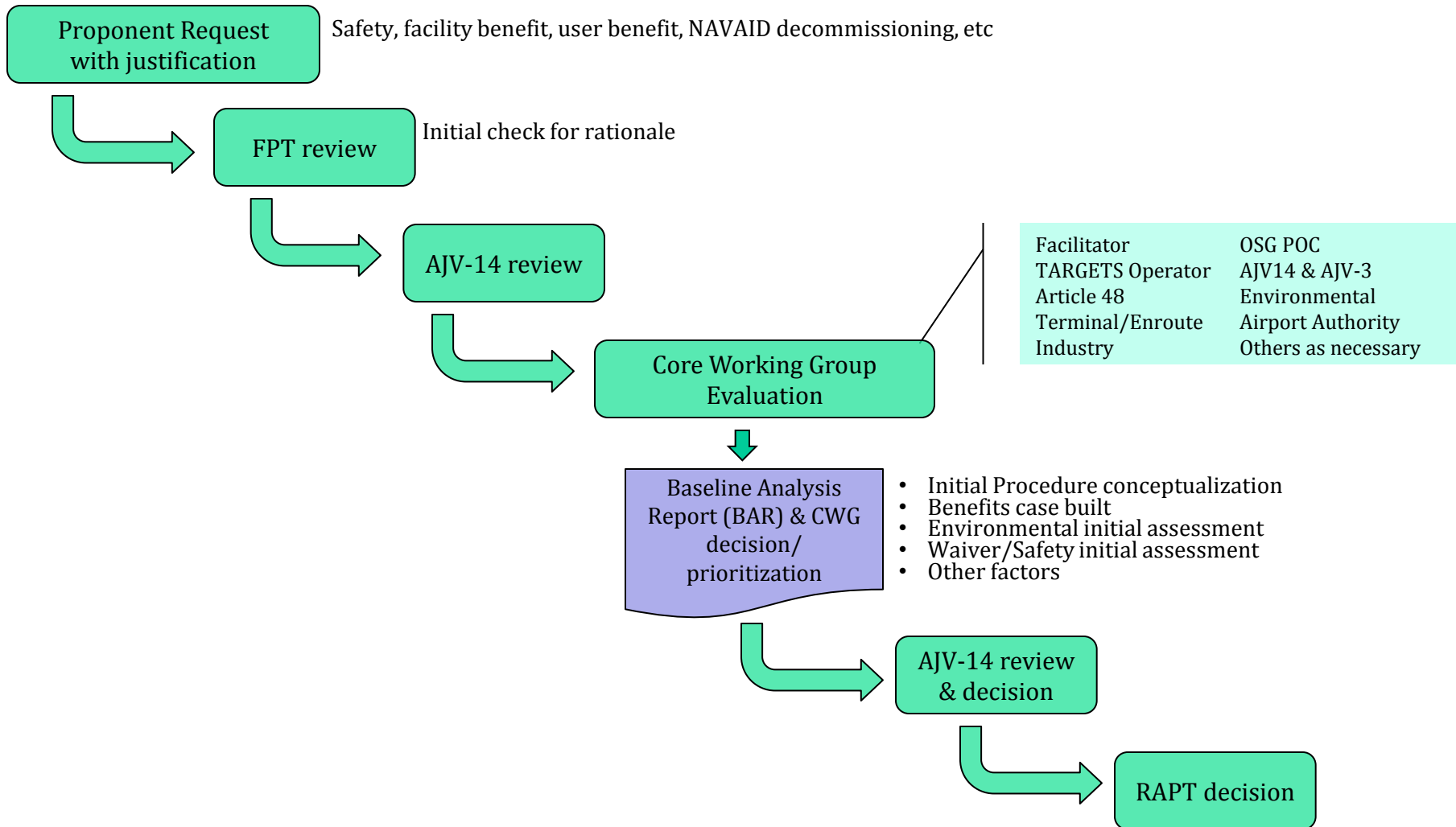
# Five Phase Process

- Originally an 18-Step process detailed in the STAR Order (7100.9E)
- 7100.41 breaks down 18-Steps into five separate phases
  - Preliminary Activities
  - Development work
  - Operational preparations
  - Implementation
  - Post-implementation monitoring and evaluation



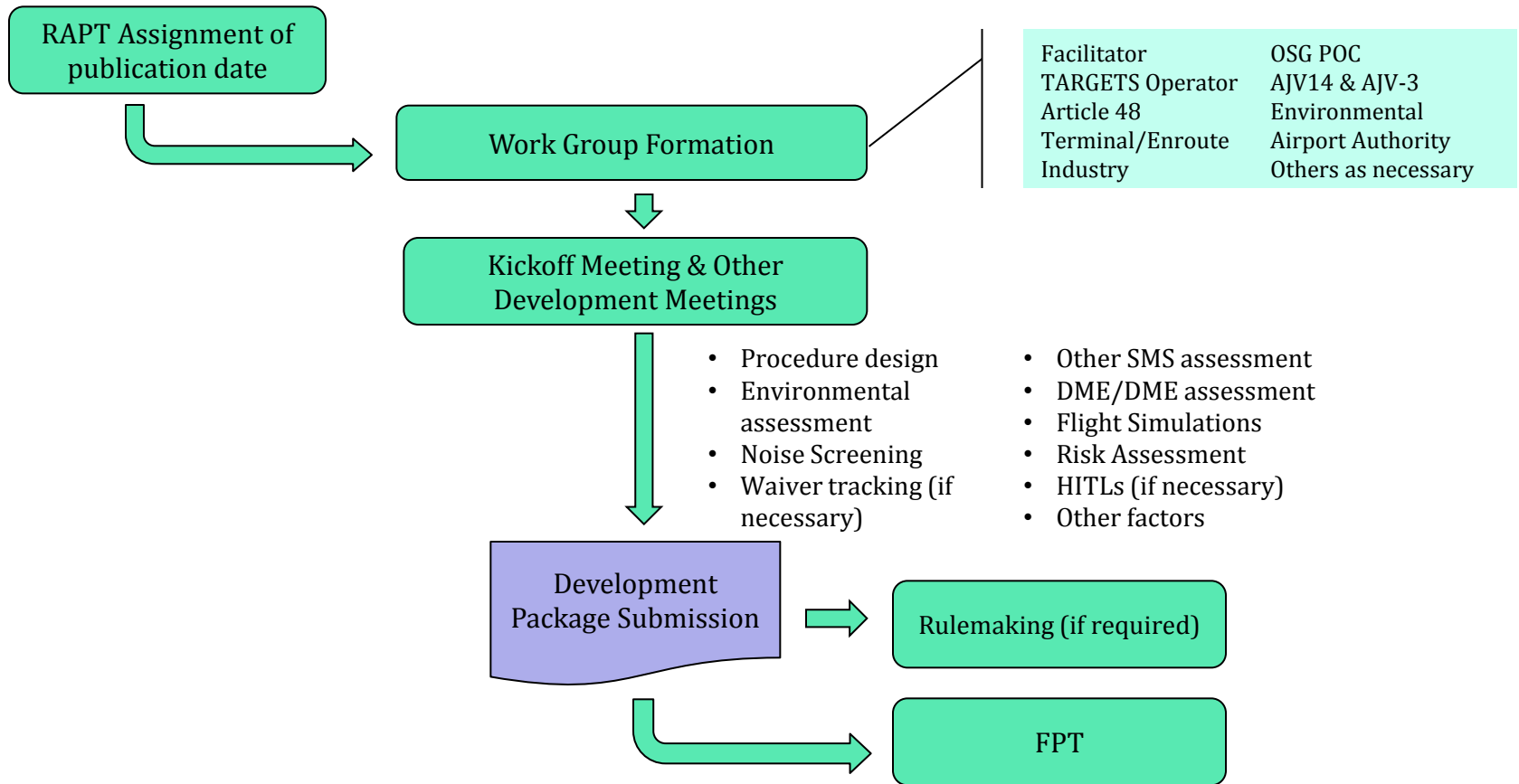
# Phase 1: Preliminary Activities

**Note: Each phase requires review of lessons learned and allows for input of new lessons learned**



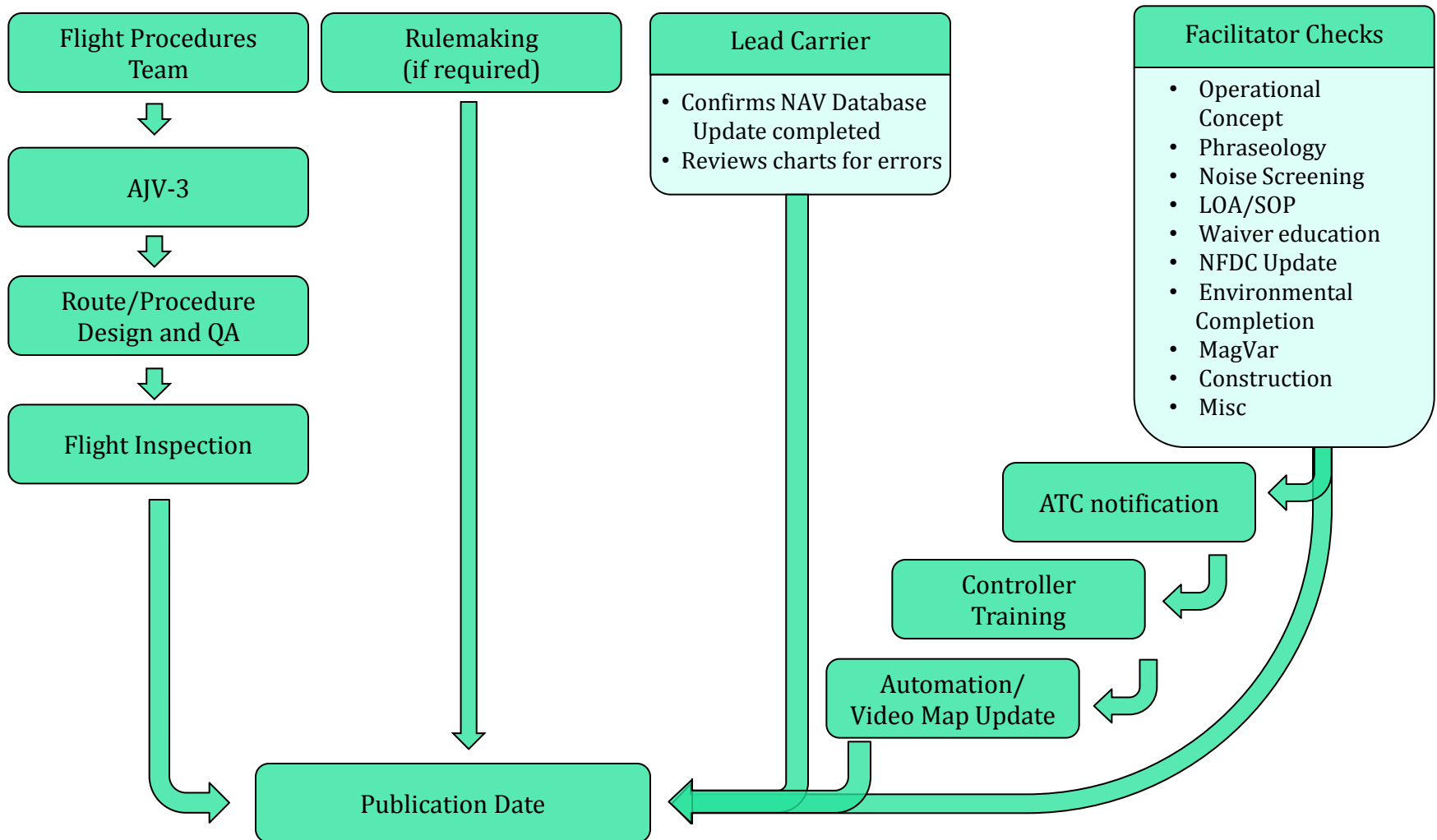
# Phase 2: Development Work

Note: Each phase requires review of lessons learned and allows for input of new lessons learned



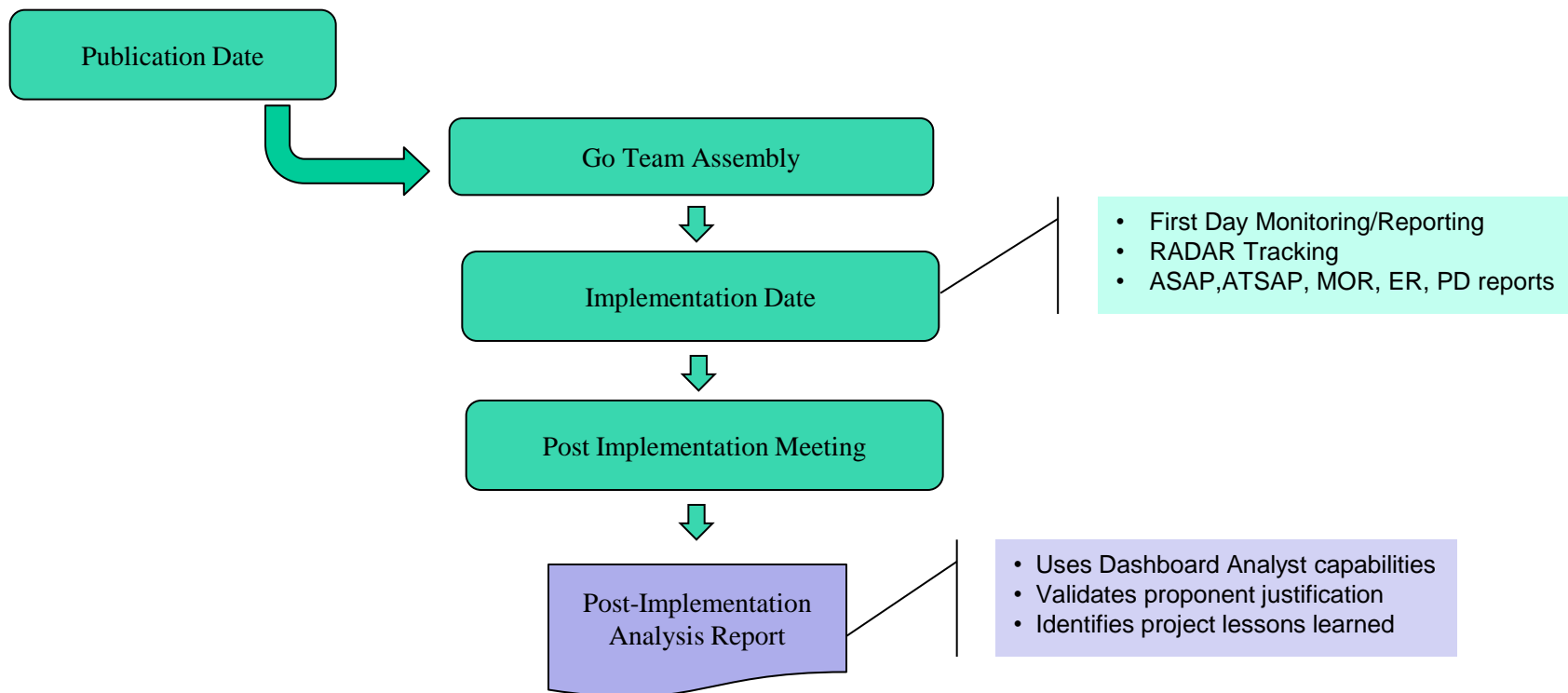
# Phase 3: Operational Preparation

**Note: Each phase requires review of lessons learned and allows for input of new lessons learned**



# Phase 4/5: Implementation/Post

**Note: Each phase requires review of lessons learned and allows for input of new lessons learned**



# NAC Recommendation vs. PBN Order

- Report identified lack of coherent vetting capability by RAPT due to all PBN procedures being classified as “high” priority
  - Recommended 2 step checklist for RAPT use
    - Step 1 Pre-Requisite
    - Step 2 Benefit/Access

*Note: None of the checklist criteria are disqualifiers...rather are a part of the subjective review process*

- 7100.41 and supporting processes address all of these considerations either pre-RAPT or post-RAPT
  - Pre-Requisite: captured in Proponent/Core Working Group processes
  - Benefit/Access: captures throughout entire 5-Phase process  
(Phase 1, Phase 2, Phase 5)



# NAC Recommendations vs. PBN Order

## Prerequisite Recommendations

- 1) What is the goal or aim of the procedure being proposed or amended?
- 2) What metric will be used to measure success?
- 3) What are the implementation hurdles?
- 4) Will PBN training, recommended in the NAC at their June 2013 meeting, be accomplished?
- 5) Does the procedure require an EIS?
- 6) Was the procedure developed in a collaborative process with appropriate representation of navigation equipment in simulator trials?
- 7) Does the procedure have controller aids, such as similar fix names to other procedures, to promote application and usage?

NOTE: If these and other pre-requisites are not present, they are not disqualifiers but they certainly limit the success of implementation and thus should warrant a lower priority of implementation

## Benefit/Access Recommendations

- 1) To what degree is capacity or efficiency increased?
- 2) Does it provide access or lower minima to a particular runway that did not have previous access?
- 3) How many operations are impacted by the procedure?
- 4) Does the procedure supply redundancy in case of a NAVAID outage?
- 5) Does the procedure reduce terminal or approach flight time?
- 6) Are conflicts between adjacent airports resolved?

### PHASE 1: PROPONENT INPUT

### PHASE 1: BASELINE ANALYSIS REPORT

### PHASE 2: CORE WG DEVELOPMENT

### PHASE 3: OPERATION PREPARATION

### PHASE 4/5: IMPLEMENTATION/POST-ANALYSIS



# NAC Recommendations vs. PBN Order

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## PHASE 1: BASELINE ANALYSIS REPORT

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## PHASE 2: CORE WG DEVELOPMENT

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## PHASE 3: OPERATION PREPARATION

- 4) Will PBN training, recommended in the NAC at their June 2013 meeting be accomplished?

## PHASE 4/5: IMPLEMENTATION/POST-ANALYSIS

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PREREQUISITE

BENEFITS/ACCESS



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# Closing

- FAA O 7100.41, PBN Implementation Process Order – signed and posted
- Effective date of the order is April 3, 2014